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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/734,014	12/11/2003	John G. Nunan	034166.053	2369

25461 7590 04/11/2008

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EXAMINER	
MERKLING, MATTHEW J	

ART UNIT	PAPER NUMBER
1795	

MAIL DATE	DELIVERY MODE
04/11/2008	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/734,014	Applicant(s) NUNAN, JOHN G.	
	Examiner MATTHEW J. MERKLING	Art Unit 1795	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *06 December 2007*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-25* is/are pending in the application.

4a) Of the above claim(s) *14-24* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-13 and 25* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 1-6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nunan ("Impact of Pt-Rh and Pd-Rh Interactions on Performance of Bimetal Catalysts", SAE Technical Paper Series, 1995).

Regarding claims 1-4, Nunan discloses an exhaust treatment device (page 1, col. 2 lines 6-16), comprising:

a substrate (page 1, col. 2 lines 7-10);

a 1-catalyst layer (see page 3, col. 2 final paragraph where Nunan discloses a co-impregnated Pd-Rh catalyst in one layer) where deposited on the substrate (page 1, col. 2 lines 7-10), the catalyst layer comprising a first catalyst metal (Pd) and a second catalyst metal (Rh) (page 3 col. 2, final paragraph); and

wherein the first catalyst metal and the second catalyst metal are different and are palladium and rhodium (page 3, col. 2, final paragraph).

Regarding the claimed feature of the percentage of 'non-alloyment under alloying conditions' in claims 1, 3 and 4, there is no indication either in the claims

or the specification that the prior art (Nunan) would not also contain this property. In fact, Nunan discloses a preference for operating the co-impregnated Pd/Rh catalyst in a non-alloyed state. For example, see Figs. 5 and 7 which are comparisons of alloyed and non-alloyed Pd/Rh catalysts. It can clearly be seen that a non-alloyed Pd/Rh catalyst (as shown in Fig. 7) better exhibits the NOx reduction property of Rh than does the alloyed Pd/Rh catalyst shown in Fig. 5.

While Nunan does not explicitly disclose the percentages of alloyed and non-alloyed metals (Pd and Rh), Nunan clearly discloses the preference for non-alloyed Pd/Rh catalyst (as mentioned above). As such, it would have been obvious to one of ordinary skill in the art at the time of the invention to keep the Pd/Rh catalyst of Nunan as close to 100% non-alloyed as possible in order to retain the Rh function of NOx conversion.

Furthermore, regarding limitations recited in claims 1-4 which are directed to a manner of operating disclosed system (such as the claimed "alloying conditions"), neither the manner of operating a disclosed device nor material or article worked upon further limit an apparatus claim. Said limitations do not differentiate apparatus claims from prior art. See MPEP §2114 and 2115. Further, process limitations do not have a patentable weight in an apparatus claim. See *Ex parte Thibault*, 164 USPQ 666, 667 (Bd. App. 1969) that states "Expressions relating the apparatus to contents thereof and to an intended operation are of no significance in determining patentability of the apparatus claim.

Regarding claims 5 and 6, Nunan discloses a palladium/rhodium ratio of 5/1 (page 2, col. 1 lines 6-7).

3. Claims 7-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nunan ("Impact of Pt-Rh and Pd-Rh Interactions on Performance of Bimetal Catalysts") in view of Fujitani et al. (US 4,239,656).

Regarding claims 7 and 8, Nunan, as discussed in claim 1 above, discloses all of the claim limitations including the catalyst layer comprising an aluminum oxide (Al_2O_3, page 1, col. 2 'CATALYST FORMULATIONS') and an oxygen storage component (cerium, page 1, col. 2 'CATALYST FORMULATIONS').

Nunan fails to teach the average pore diameters of the aluminum oxide and oxygen storage component are in the range of 150Å – 1000Å and 50% to 80% of the pore volume is based on the volume of pores from 180Å – 800Å.

Fujitani also discloses a catalyst for purifying exhaust gases and a carrier for the catalyst (see title).

Fujitani teaches a catalyst support (γ-Al_2O_3, see Example 3 or Example 5 of Fujitani) with an oxygen storage component (cerium, col. see Example 3 or Example 5 of Fujitani) and an average pore diameter of 400Å (0.04 μm, see Example 3 or Example 5 of Fujitani). Fujitani teaches this in order to provide a catalyst support with a high compressive strength (col. 8 lines 61-68). Fujitani also teaches the pore diameter to the pore volume distribution in Fig. 2 of this catalyst, and further discloses that the pore diameters of the Fujitani invention are distributed over a very narrow range (col. 7 lines 4-8). It is clear to see from

Fig. 2, that 50% - 80% of the total volume comes from the pore with diameters in the range of 180Å – 800Å (see curve 1 in Fig. 2). Fujitani teaches this catalyst and structure this as a successful way of removing NO_x, CO, and HC from exhaust gasses (see Table 9).

It would have been obvious to one of ordinary skill in the art at the time of the invention to use the catalyst support with the pore diameter and total pore volume to pore size distribution of Fujitani in the exhaust treatment device of Nunan in order to successfully remove NO_x, CO, and HC from exhaust gasses as well as providing a carrier which exhibits a strong compressive strength.

Regarding claims 9 and 10, Nunan further discloses the aluminum oxide as γ-Al_2O_3 (page 2, col. 1 lines 34-39) and the oxygen storage component as cerium (page 2, col. 1 lines 2-5).

4. Claims 11 and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nunan ("Impact of Pt-Rh and Pd-Rh Interactions on Performance of Bimetal Catalysts") and Fujitani et al. (US 4,239,656) as applied to claim 7 above, and further in view of Anatoly et al. (US 6,387,338).

Regarding claims 11 and 12, modified Nunan discloses all of the claim limitations, but fails to teach the composition of the oxygen storage component.

Anatoly discloses oxygen storage materials.

Anatoly teaches an oxygen storage component with the composition of $Zr_{0.65}Ce_{0.25}La_{0.04}Y_{0.06}O_{1.95}$ (see Example 5) in order to enhance the phase stability

under high temperature oxidizing and reducing conditions (see Brief Description of Fig. 14).

It would have been obvious to one of ordinary skill in the art at the time of the invention to use the composition of Anatoly in the oxygen storage component of Nunan in order to enhance the phase stability of the oxygen storage component under high temperature oxidizing and reducing conditions.

5. Claim 13 is rejected under 35 U.S.C. 103(a) as being unpatentable over Nunan ("Impact of Pt-Rh and Pd-Rh Interactions on Performance of Bimetal Catalysts") and Fujitani et al. (US 4,239,656) as applied to claim 7 above, and further in view of Suzuki et al. (US 6,335,305).

Regarding claim 13, modified Nunan discloses all of the claim limitations, but fails to teach the oxygen storage component has a stable cubic structure.

Suzuki also discloses a catalyst for purifying exhaust gas (see title).

Suzuki teaches an oxygen storage component with a cubic structure in order to maintain the structure even if a large amount of oxygen is discharged and since oxygen moves freely in the cubic structure, it shows excellent oxygen storage ability as compared to other structures (col. 6 lines 18-24).

It would have been obvious to one of ordinary skill in the art at the time of the invention to use the cubic structure of the oxygen storage component, as in Suzuki, in the oxygen storage component of Nunan in order to maintain the structure even if a large amount of oxygen is discharged and since oxygen

moves freely in the cubic structure, it shows excellent oxygen storage ability as compared to other structures.

6. Claim 25 is rejected under 35 U.S.C. 103(a) as being unpatentable over Nunan ("Impact of Pt-Rh and Pd-Rh Interactions on Performance of Bimetal Catalysts") in view of Fujitani et al. (US 4,239,656) and Foster (US 5,857,140).

Regarding claim 25, Nunan discloses an exhaust treatment device (page 1, col. 2 lines 6-16), comprising:

a substrate (page 2, col. 1 lines 7-10);

a catalyst layer deposited on the substrate (page 2, col. 1 lines 7-10), the catalyst layer comprising a first catalyst metal (Pd) and a second catalyst metal (Rh) (page 3 col. 2, final paragraph); and

wherein the first catalyst metal and the second catalyst metal are different and are palladium and rhodium (page 3, col. 2, final paragraph), and an aluminum oxide (Al_2O_3, page 1, col. 2 'CATALYST FORMULATIONS') and an oxygen storage component (cerium, page 1, col. 2 'CATALYST FORMULATIONS').

Nunan fails to teach the average pore diameters of the aluminum oxide and oxygen storage component are in the range of 150Å – 1000Å and 50% to 80% of the pore volume is based on the volume of pores from 180Å – 800Å.

Fujitani also discloses a catalyst for purifying exhaust gases and a carrier for the catalyst (see title).

Fujitani teaches a catalyst support (γ-Al_2O_3, see Example 3 or Example 5 of Fujitani) with an oxygen storage component (cerium, col. see Example 3 or

Example 5 of Fujitani) and an average pore diameter of 400Å (0.04 μm, see Example 3 or Example 5 of Fujitani). Fujitani teaches this in order to provide a catalyst support with a high compressive strength (col. 8 lines 61-68). Fujitani also teaches the pore diameter to the pore volume distribution in Fig. 2 of this catalyst, and further discloses that the pore diameters of the Fujitani invention are distributed over a very narrow range (col. 7 lines 4-8). It is clear to see from Fig. 2, that 50% - 80% of the total volume comes from the pore with diameters in the range of 180Å – 800Å (see curve 1 in Fig. 2). Fujitani teaches this catalyst and structure this as a successful way of removing NO_x, CO, and HC from exhaust gasses (see Table 9).

It would have been obvious to one of ordinary skill in the art at the time of the invention to use the catalyst support with the pore diameter and total pore volume to pore size distribution of Fujitani in the exhaust treatment device of Nunan in order to successfully remove NO_x, CO, and HC from exhaust gasses as well as providing a carrier which exhibits a strong compressive strength.

Nunan also fails to teach a retention material disposed around the substrate to form a subassembly and also a housing disposed around the subassembly.

Foster also discloses an exhaust gas treatment device (see Fig. 1)

Foster teaches a retention material (mat, (24)) in order to support the substrate (18) and prevent excessive heat loss (col. 1 line 64 – col. 2 line 5), and also teaches a housing (12) around the substrate and the retention material to improve the durability of the retention material (intumescent material, col. 1 line 64 – col. 2 line 5).

It would have been obvious to one of ordinary skill in the art at the time of the invention to add the retention material and housing of Foster, to the exhaust treatment device of Nunan in order to support the substrate and prevent excessive heat loss and to improve the durability of the retention material.

Regarding the claimed feature of the percentage of 'non-alloyment under alloying conditions' there is no indication either in the claims or the specification that the prior art (Nunan) would not also contain this property. The process of making the claimed catalyst (according to the specification) is substantially identical to the prior art (Nunan, where Pd and Rh salts are slurried together and washcoated on the substrate, page 1, col. 2 'CATALYST FORMULATIONS') and it is reasonable to assume that it would contain the same "non-alloyment under alloying conditions' properties of the claimed invention. Something that is old does not become patentable upon discovery of a new property (see MPEP §2112).

Where the claimed and prior art product(s) are identical or substantially identical, or are produced by identical or substantially identical process(es) the burden of proof is on applicant to establish that the prior art product(s) do not necessarily or inherently possess the characteristics of the instantly claimed product(s), see In re Best, 195 USPQ 430.

Response to Arguments

7. Applicant's arguments filed 12/6/07 have been fully considered but they are not persuasive.

8. On pages 9-11 of Applicant's reply (12/6/07), Applicant argues:

> The SAE *Nunan* paper does not disclose a one-layer formulation of catalyst wherein 70% or more of the first catalyst and the second catalyst are non-alloyed under alloying conditions. Consequently, the SAE *Nunan* paper fails to disclose an essential feature of the present invention.
>
> Neither is there any suggestion or teaching in the SAE *Nunan* paper which would provide a reason for a person skilled in the art to arrive at applicant's invention of a one-layer catalyst where at least 70% or more of the first and second catalyst are non-alloyed.

As best understood, Applicant is arguing that the Nunan prior art only teaches and suggests an alloyed (between Pd and Rh) catalyst. The examiner respectfully disagrees with this argument. Throughout the Nunan reference, it is explicitly disclosed that a non-alloyed catalyst (which is co-impregnated, meaning it is in the same catalyst layer) is preferable over an alloyed catalyst. For example, in Fig. 5, Nunan shows the performance of a catalyst that contains an alloyed catalyst:

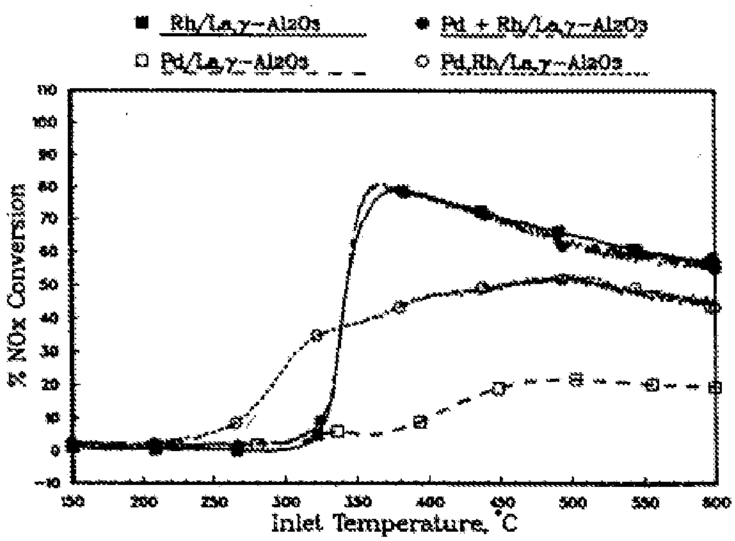

Figure 5: Alloying between Pd and Rh has a large detrimental impact on high temperature NOx performance.

As can also be seen in the caption, Nunan explicitly states the detrimental effects of alloying a Pd/Rh catalyst.

Furthermore, Nunan also discloses a Figure which indicates the catalyst performance when the Pd/Rh catalyst are non-alloyed:

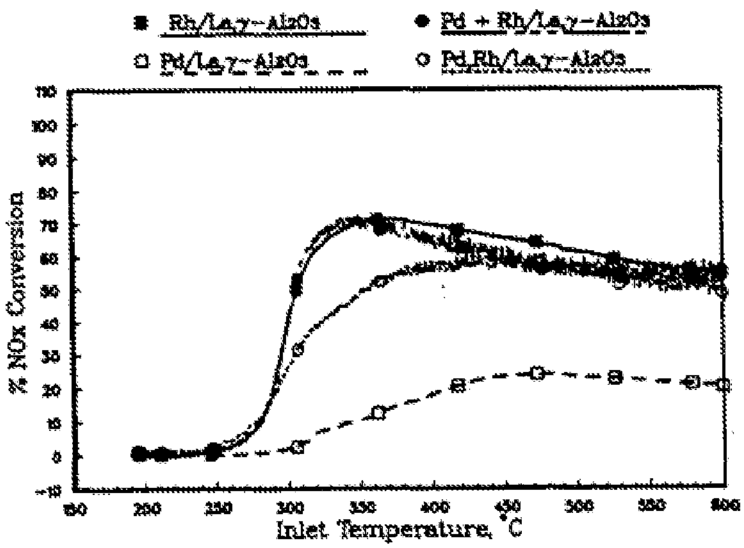

Figure 7: The light-off performance for NOx over the Pd-Rh catalyst looks more Rh-like after the high temperature lean conditioning.

As shown by comparing these two graphs, after the high temperature lean conditioning of the Pd/Rh catalyst (which "de-alloys" the Pd/Rh catalyst, see Nunan, page 4, col. 2, final paragraph - page 5, col. 1 first paragraph).

As such, Nunan explicitly discloses an example where a single layer Pd/Rh catalyst is non-alloyed, and further suggests the preference for de-alloying the Pd/Rh catalyst.

On pages, 10 and 11, Applicant argues that Fujitani does not render the present invention obvious for the following reasons:

i) The particle size and pore size distribution (0.01 – 2 microns) described by *Fujitani* covers an extremely wide range of pore sizes and in fact encompasses nearly all practical support materials commonly used in heterogeneous catalysis.

ii) The reason *Fujitani* concerns himself with a discussion of porosity in this very wide range is that he is preparing $MgAl_2O_4$ spinel materials by calcining a mixture of alumina and magnesia at up to 1350°C. Calcination at such high temperatures typically generates fully dense, low surface area materials as seen in Tables 4 and 6 of *Fujitani*.

iii) The official action makes reference to *Fujitani* at col. 10, lines 65–68, where there is a disclosure of an alumina-magnesia support (shown in table 5, in col.9) which *Fujitani* identifies as the C2 support material having a pore volume of 0.5 cm^3/g, a pore diameter of 0.02 microns and a surface area of 98 m^2/g. However, carrier 2 is a comparative carrier which is NOT in fact a part of the *Fujitani* invention. This is specifically stated later in col. 11, lines 21–25, where it is stated that the C2 support material is in fact not of the invention being described by *Fujitani*. Thus *Fujitani* states in col. 11, lines 21 - 25: *"It is also evident that the catalysts (S3 and S4) having the carrier (No. C2) prepared by depositing ceria on the conventional carrier have much lower activities than the catalysts of the present invention."*. *Fujitani* clearly teaches away from using carriers of the type shown in his comparative carrier examples in Table 9.

iv) In conclusion, the basis of the *Fujitani* invention is that the support for the PGMs (Pt, Pd and Rh) consists of a low surface area composite material consisting of $MgAl_2O_4$ spinels, alumina and ceria and that the catalyst preparation involves the physical separation of Pd and Rh in the formation of the final catalyst.

The examiner respectfully disagrees with these arguments. Addressing each of these arguments:

i) this argument is irrelevant as Fujitani specifically discloses a pore diameter in the claimed range.

ii) and iv) The examiner recognizes that the Fujitani reference is not teaching an identical catalyst as in the present invention. However, the examiner is not modifying Nunan reference with the specific $MgAl2O4$ spinel materials of Fujitani, but rather the general teaching of pore sizes used in a catalyst and the motivation for using these pore sizes.

Regarding Applicant's argument noted 'iii)' above. The examiner inadvertently cited the incorrect passage from the Fujitani reference when referring to the pore diameter of the substrate. However, throughout the reference, Fujitani discloses several examples of a pore diameter which falls within the claimed range, and discloses preferences for using this pore diameter (for example, the small pore diameters provide a high compressive strength; see col. 8 lines 61-68). As such, the examiner finds this as sufficient motivation in order to implement the pore sizes of Fujitani into the carrier of Nunan.

It appears that the heart of Applicant's invention is the non-alloying catalyst structure of claim 1 where the catalysts are non-alloyed in order to avoid "hiding" the function of a particular catalyst element (such as rhodium). It is the examiner's position that this feature is well documented (both in structure and motivation for using this specific non-alloying structure) in Nunan.

Conclusion

9. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to MATTHEW J. MERKLING whose telephone number is (571)272-9813. The examiner can normally be reached on M-F 8:30-4:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Alexa Neckel can be reached on (571) 272-1446. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/M. J. M./
Examiner, Art Unit 1795

/Alexa D. Neckel/
Supervisory Patent Examiner, Art Unit 1795